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DRAWINGS AMENDMENTS

Please correct Figure 1C to replace item "26B"
identifying the photoresist with "25A" as indicated in the
proposed replacement sheet.

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Remarks

Thorough examination by the Examiner is noted and appreciated.

The drawings have been amended to overcome Examiners objections.

The Specification has been amended to correct grammatical errors and to overcome Examiners Objections.

The claims have been amended and new claims added to clarify Applicants disclosed and claimed invention and recite indicated allowable subject matter as indicated by Examiner. The amendments find support in the original claims and/or the Specification.

No new matter has been added.

Claim Rejections under 35 USC 112

Claims 18 and 19 have been amended to overcome Examiners rejection under 35 USC 112, first paragraph.

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Claim Rejections under 35 USC 103

1. Claims 1-4, 6, and 9 stand rejected under 35 USC Section 103(a) as being unpatentable over Zheng et al. (US, 762,085) in view of Luo et al. (US 379,576).

Zheng et al. teach a method of forming a CMOS device (see abstract). Zheng teach an ion implantation process using a photoresist mask (col 4, lines 15-49). Zheng et al. teach an oxygen plasma ashing process to remove the photoresist following the ion implantation process (col 4, lines 49-50).

Zheng et al. does not suggest or disclose removing the photoresist according to "removing the photoresist according to at least one plasma assisted process comprising fluorine containing, oxygen, and hydrogen containing plasma source gases".

On the other hand, Luo et al. disclose "a Variable mode plasma system and method for processing a semiconductor wafer. The modulation of the plasma potential relative to the semiconductor wafer is varied for different process steps." (See Abstract).

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Luo et al. disclose "removal of photoresist after high-dose ion implant (hereinafter "HDIS process"). These processes are adapted to allow fast removal of photoresist with minimum oxide loss and without causing popping on the wafer."

Luo et al. also disclose using plasma source gases including CF₄, oxygen, hydrogen (at 4%), and argon in a variable mode etch process where the pressure is reduced and the bias power of during a multiple step etch process. Luo et al. also disclose using nitrogen in place of argon.

Even assuming arguendo, proper motivation for combining the teachings of Zheng et al. and Luo et al., such combination does not produce Applicants disclosed and claimed invention.

Nowhere does Luo et al. recognize or teach a method for overcoming the problem that Applicants have recognized and solved by their claimed invention: "a method for reducing the loss of silicon in a plasma assisted photoresist etching process". The variable mode plasma etch process of Luo et al. is taught to reduce silicon oxide loss. The variable mode plasma etch process of Luo et al. would not accomplish Applicants disclosed and

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claimed invention since the silicon substrate would not be exposed in the method as taught by Luo et al.

2. Claim 5 stands rejected under 35 USC Section 103(a) as being unpatentable over Zheng et al. (US, 762,085) in view of Luo et al. as applied above, and further in view of Xu et al. (US 6,479,396).

Applicants reiterate the comments made above with respect to Zheng et al. and Luo et al.

Xu et al. discloses a process for removing residual etching residues and photoresist simultaneously following formation of a **via landed on tungsten** (see Abstract). Xu et al. teach using CF₄, hydrogen, oxygen and nitrogen in a dry etch process to strip the resist, teaching the beneficial effect is to improve the topography of the tungsten contact surface including forming an undercut in the tungsten (col. 7, lines 33-col. 8, line 33). In another embodiment, an oxygen/nitrogen/hydrogen chemistry is employed to first remove the resist followed by adding fluorine to etch the tungsten.

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There is no apparent motivation to combine Xu et al. with either Zheng et al. or Luo et al. Luo et al. and Xu et al. disclose processes that work by a different principal of operation, and Luo et al. and Zheng et al. disclose the formation of an entirely unrelated semiconductor structure with respect to Xu et al. There is no suggestion in Xu et al. that the disclosed etch chemistry may have a beneficial effect in preventing the loss of silicon. The etch chemistry in Xu et al. is taught to **preferentially etch tungsten** and residual polymers following a via formation process. Moreover, Xu et al. discloses that the etch chemistry **etches (penetrates) the sidewalls of the via** which where the sidewalls of the are formed of an oxide material, thus preferentially etching oxide and making the method of Luo et al. unsuitable for its intended operation, which is taught to **minimize oxide loss.**

Nevertheless, even assuming *arguendo* a proper motivation for combination, such combination does not produce Applicants disclosed and claimed invention. Nowhere do the references disclose or suggest exposing silicon to an etching chemistry "to coordinatively saturate at least a portion of coordinatively unsaturated silicon bonds comprising the silicon substrate".

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With respect to claim 5, Xu et al. disclose a nitrogen to hydrogen ratio where nitrogen may range from 90% to 100% and hydrogen may range from 0% to 10% (e.g., 9/1 to 10/1). The fact that Xu et al. disclose a nitrogen to hydrogen ratio in an unrelated and different manufacturing process which operates by a different principal of operation and which happens to fall with Applicants disclosed and claimed range does not help Examiner in establishing a *prima facie* case of obviousness.

A prior art reference must be considered in its entirety, i.e., as a whole including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc., Garlock, Inc.*, 721 F.2d, 1540, 220 USPQ 303 (Fed Cir. 1983), cert denied, 469 U.S. 851 (1984).

"If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." *In re Ratti*, 270 F.2d 810, 123, USPQ 349 (CCPA 1959).

"If proposed modification would render the prior art

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invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

3. Claim 10 stands rejected under 35 USC Section 103(a) as being unpatentable over Zheng et al. (US, 762,085) in view of Luo et al. as applied to claim 1 above, and further in view of Robertson (US 6,699,771).

Applicants reiterate the comments made above with respect to Zheng et al. and Luo et al.

The fact that Robertson discloses that halogen species are implanted into an amorphous region of a semiconductor substrate formed during ion implantation (See Abstract) does not help Examiner in establishing a *prima facie* case of obviousness.

Nowhere does Robertson disclose Applicants steps of masking the substrate with photoresist, ion implanting, and removing photoresist as Applicants have disclosed and claimed.

"The fact that references relied upon teach that all aspects of the claimed invention were individually known in the art is

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not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references." *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993).

"Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Applicants have incorporated indicated allowable subject matter into claim 1 and new claim 21.

Based on the foregoing, and Examiners indication of allowable subject matter, Applicants respectfully submit that the Claims are now in condition for allowance. Such favorable action by the Examiner at an early date is respectfully solicited.


In the event that the present invention as claimed is not in a condition for allowance for any other reasons, the Examiner is respectfully invited to call the Applicants' representative at his

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Bloomfield Hills, Michigan office at (248) 540-4040 such that necessary action may be taken to place the application in a condition for allowance.

Respectfully submitted,

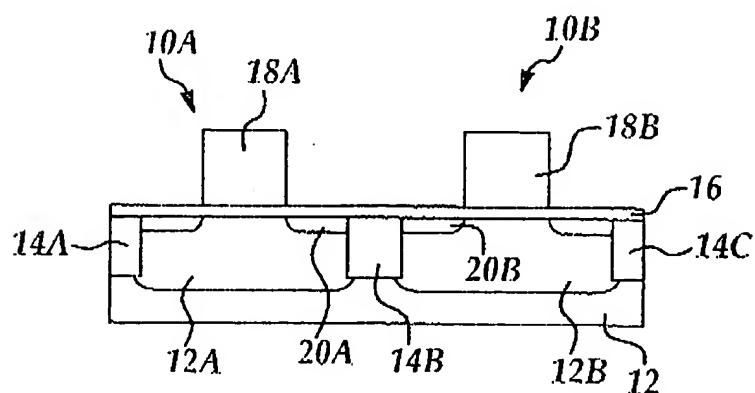
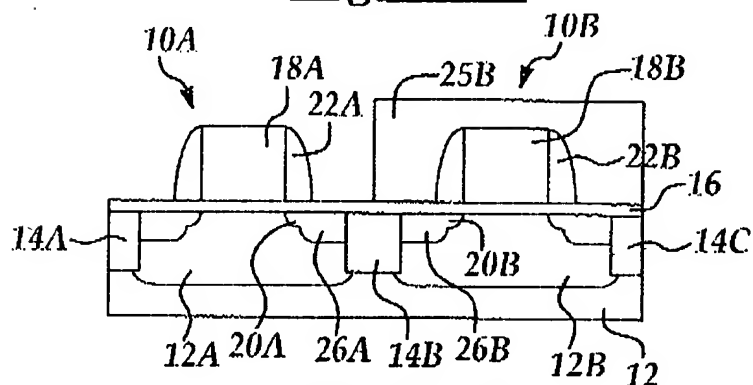
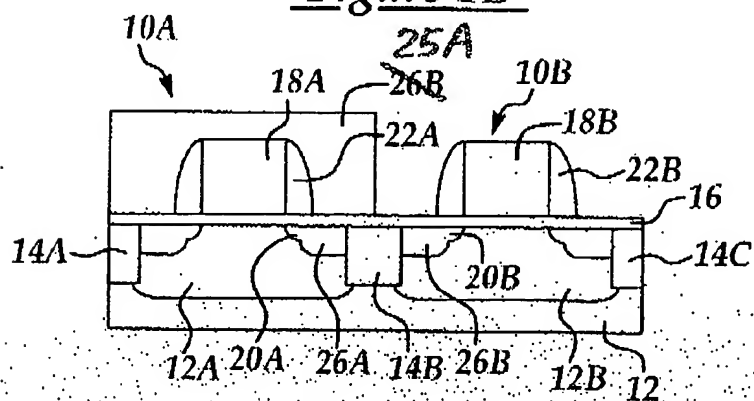
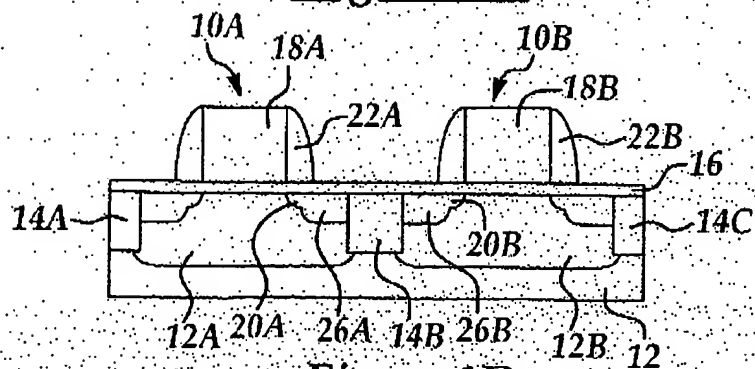
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Figure 1AFigure 1BFigure 1CFigure 1D